Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act	)	GN Docket No. 09-47
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
Development of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act	)	GN Docket No. 09-137
Implementation of Section 304 of the Telecommunications Act of 1996	)	CS Docket No. 97-80

COMMENTS OF TIVO INC. ON NBP PUBLIC NOTICE # 27

December 22, 2009

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COMMENTS OF TIVO INC. ON NBP PUBLIC NOTICE # 27

TiVo Inc. ("TiVo") supports the Commission's inquiry into competition in the video device market and applauds its recognition that removing the persistent barriers to competition in that market will drive broadband adoption and use. TiVo manufactures video navigation devices that integrate cable and Internet-delivered content, allowing consumers to view audiovisual content from a variety of Internet sources without a computer. Innovators like TiVo who build products that compete with the devices supplied by MVPDs are put at risk by MVPDs' control over the design and functionality of competitive devices. Many features that manufacturers like TiVo seek to offer are either barred by MVPDs, do not work consistently across different MVPDs, receive inadequate support from MVPDs, or are subject to being disabled or made less useful by

MVPDs at any time. In these comments, TiVo responds to the questions raised in Public Notice #27.[1]

A. What technological and market-based limitations keep retail video devices from accessing all forms of video content that consumers want to watch?

The current regulatory framework for video devices has not achieved a level playing field for competitive devices, and as a result they have not fulfilled their full potential as drivers of broadband adoption and use.

1. What limitations prevent consumer electronics manufacturers from developing a true "plug-and- play" device that is network agnostic?

The technology for true plug-and-play operation on MVPD networks exists today. The most fundamental limitation on that technology, and therefore on competition in consumer audiovisual products, is the leverage conferred on MVPDs through their control of secure conditional access to networks. This control has allowed MVPDs to impose conditions on licenses. These licenses require any competitive entrant to adhere to all of the MVPD's specifications for and, most importantly, limitations on, the design of products, including the look, feel, and content of the graphical user interface.[2] Deviations must be requested and often are refused.

Even if the conditional access technology were to use open standards and common interfaces, for example the cryptographic cipher DES and the ISO 7816 SmartCard interface as used in Europe, the MVPD would still control the cryptographic keys that enable devices with these technologies to access content. While this control is

[1] NBP Public Notice #27, GN Docket Nos. 09-47, 09-51, 09-137, CS Docket No. 97-80 (rel. Dec. 3, 2009).
[2] CableLabs, which is funded and controlled by cable operators, requires manufacturers to conform their products to a detailed set of criteria, including specifications and limitations on the user interface, in order to connect their devices to cable networks. *See, e.g.*, Tru2Way Host Device License Agreement at 6, http://www.opencable.com/downloads/tru2way_agreement.pdf (conditioning license on certification); http://www.opencable.com/specifications/host.html (technical requirements for certified devices).

used legitimately to prevent theft of service, it also allows MVPDs to impose terms on manufacturers that go well beyond preventing theft of service or electronic harm to the network. In many cases, these terms have the purpose and effect of stifling competition in devices and suppressing a market for new modes of broadband access and use in the home.

Over 11 years ago, the Commission adopted rules concerning an interface proposed by the cable industry to separate operators' control over conditional access from other aspects of the design and functionality of video devices.[3] This interface was ultimately marketed as the CableCARD. However, the Commission's rules[4] have not prevented the cable industry from placing artificial and discriminatory restrictions on the design and functionality of customer premises audiovisual devices. For example, to build CableCARD-reliant devices, a device manufacturer must sign a license agreement with the cable industry-operated CableLabs, pass all of CableLabs' certification requirements at significant cost, and adhere to strict requirements on the use and presentation of cable content.[5] Even then, under the 2003 Plug-and-Play license and regulations, the retail device obtains access only to linear broadcast channels.[6] "Plug and Play" access does not include access to interactive content and services, even though all CableCARDs, and products such as TiVo's, have inherent interactive capabilities to communicate with a

[3] *In the Matter of Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices*, CS Docket No. 97-80, First Report and Order ¶¶ 28-32, 70-79 (rel. June 24, 1998); 47 C.F.R. §§ 76.1200 – 1205.
[4] 47 C.F.R. §§ 76.1200 – 1205.
[5] The Commission recognized the potential for abuse of this process: "[W]e are concerned that CableLabs's proposed role as the sole initial arbiter of outputs and associated content protection technologies to be used in unidirectional digital cable products could affect innovation and interoperability in a number of areas, including the development of personal digital networks in consumers' homes." *In the Matter of Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment*, CS Docket No. 97-80, PP Docket No. 00-67, Second Report and Order and Second Further Notice of Proposed Rulemaking ¶ 78 (rel. Oct. 9, 2003) ("2003 Plug and Play Order").
[6] 2003 Plug and Play Order ¶ 7.

cable head-end.[7] Other programming and data on the network that the cable subscriber *has paid for*, such as linear channels that have been moved to a switched digital[8] configuration, free and subscription on-demand titles, and all program guide data, are withheld from these retail devices.[9]

Only the few manufacturers who have agreements with cable operators to deploy the cable industry's proprietary "tru2way" middleware can create devices that access the full range of services currently offered by cable operators. Yet those tru2way products are forbidden by license from (1) providing any choice in user interface when accessing interactive services, and (2) including non-MVPD programming services, such as Internet-delivered content, in the user interface that displays the available cable programming. Tru2way thus prevents a device maker from offering a consumer the full range of options that her product is capable of providing, in a single integrated user interface.

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[7] *See In the Matter of Oceanic Time Warner Cable, et al.*, File Nos. EB-07-SE-351, EB-07-SE-352, NAL Acct. Nos. 20083210074, 200932100001, 200932100002, 200932100003, 200932100008, and 200932100023, Petition for Reconsideration or Clarification of TiVo Inc. 5-7 (July 27, 2009) ("TiVo Petition for Reconsideration").

[8] Significantly, the commercial viability of "plug and play" retail products is further compromised by the fact that they can not get access to linear channels that an MSO has decided to transmit via switched digital technology without the use of an external device that is basically another set-top box. TiVo is still attempting to obtain a clarification from the Commission that an MSO's obligation under current regulations includes the provision of such devices to enable consumers who rely on competitive products to receive channels that are *included in their* subscriptions. *Id.* Consumers who do receive these channels perceive these "SDV" channels as being no different from any other linear channels. Consumers are billed for these channels as part of a tier for which they pay an undifferentiated monthly fee. *Id.*

[9] *See* Tru2Way Host Device License Agreement at 5, (noting that the agreement does not make guide data available to device manufacturers). NCTA, the cable industry's trade association, has argued that competitive manufacturers should not be allowed "to rip, mix, and burn their own CE [program] guides" using guide data that subscribers pay for and that cable operators transmit. *In the Matter of Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment*, CS Docket No. 97-80, PP Docket No. 00-67, Reply Comments of the National Cable and Telecommunications Association 27 (Sep. 10, 2007). Without competitive access to MVPD-provided guide data, consumers who use competitive devices effectively pay for two sets of guide data, only one of which they can use.

In order for manufacturers to create true "plug and play" video devices, these MVPD-imposed, unnecessary limitations need to be removed. Complementary and competitive content sources should be permitted to be integrated with MVPD programming even if this disrupts the MVPD's preferred financial models. The devices in which consumers invest should provide to consumers the full lawful MVPD and Internet access of which they are capable, irrespective of an MVPD's desire to turn its bottom-line preferences into licensing obligations.

There is a long history of innovation disrupting established businesses, particularly in media and communications.[10] If innovators had to ask permission, there would be no TiVo, Google, iPod, or Skype. MVPDs' continuing ability to leverage control over conditional access into control over design and functionality of competing products has been the prime impediment to true "plug-and-play" and to innovation in video devices. Without more vigorous Commission oversight of MVPDs' abuse of position, bringing a viable product to market that satisfies the technical and licensing requirements imposed by cable and non-cable MVPDs will be next to impossible.

2. What technical or market limitations keep certain video devices from accessing video services to which a consumer has subscribed?

TiVo's response to question A-1 illustrates why retail-available video devices are unable to access certain video services (often, *any* video services apart from linear, non-switched channels). Unless a device maker signs a tru2way license with CableLabs, its

[10] For a discussion of the benefits of innovation without permission and how innovation disrupts incumbents, *see* Lessig, Lawrence, *Free Culture: How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity* (Penguin 2005). Ironically, cable TV disrupted the broadcasting business and was attacked for "free riding" on the value created by broadcasters' content..

devices cannot receive an MSO's video-on-demand and other "two way" services.[11] Even though they may be technically capable of such access or easily could be made so, these devices are denied access to programming, data, and service offerings on the basis of business decisions by MVPDs.[12]

3. With respect to Internet access, consumers can purchase or lease interface devices (for example, cable modems) that perform all of the network-specific functions and connect via Ethernet ports to a multitude of competitively provided consumer devices including computers, printers, game consoles, digital media devices, wireless routers, refrigerators, network storage devices, and more. What technical or market limitations prevent video content distributors from providing similar devices that allow for innovation in the navigation device market?

There are no technical limitations preventing an MVPD from allowing innovation in the navigation device market, any more than the Carterfone company faced real technical limitations in connecting its devices to the phone network.[13] The transition to digital techniques has given MVPDs the opportunity to support secure and lawful device innovation through national standards. Elements that are unnecessarily restrictive and proprietary are more matters of business choice than of technical necessity.

The cable modem is a good example of why the limitations facing competitive device manufacturers are not technological in nature:

- A DOCSIS cable modem receives Internet Protocol packets via MPEG-2 transport streams modulated in QAM carriers.
    - MSO-supplied digital set-top boxes *also* receive video content via MPEG-2 transport streams in QAM carriers.

[11] *See* 2003 Plug and Play Order ¶ 7 (noting that the interface for competitive devices mandated by Commission regulations is limited to unidirectional service).
[12] TiVo Petition for Reconsideration 5-7.
[13] *In the Matter of the Use of the Carterfone Device in Message Toll Telephone Service*, 13 F.C.C.2d 420, 1968 WL 13208, at *3-4 (adopting examiner's finding that the Carterfone device had "no material adverse effect upon use of the telephone system.").

- A cable modem transmits IP packets upstream to the cable head-end using the SCTE DOCSIS standards.
    - Audiovisual navigation devices are *capable* of tuning and receiving cable modem signals and vice-versa.
- A cable modem secures communications with the cable head-end using a published cryptographic cipher (DES) and standard X.509 digital certificates.[14]
    - A cable set-top box transmits IP packets upstream to the cable head-end using one of three SCTE standards, one of which is the DOCSIS standard.
- DOCSIS modems use as their 'output' the ubiquitous and universal Ethernet port with open standard protocols that allow any device to connect to them.
    - By contrast, video set-tops often do not have Ethernet ports, and if they do, manufacturers are often *prohibited* from allowing video content to go out on those ports.

Cable MSO-supported secure digital outputs are generally limited to HDMI, which employs technology and a content protection regime that limits usage and prevents recording of content from the set-top. Even with the addition of the HDMI-CEC control option, HDMI is *not* a home networking standard. Video content transmitted over an HDMI interface cannot be stored or moved around the home on a network. HDMI-output content is meant purely, simply, and entirely for display without compression, alteration, storage, or response. This means no other device can record the content, use its own user interface to access the content, or make the content lawfully available to other CE devices.

HDMI outputs are, by design, too limited in purpose and restricted in function to serve as an interface between an MVPD's network device and any device other than a single display. This secure, unidirectional, uncompressed interface was designed and is used as an interface from a single set-top box to a single display. As such it is a bulwark

[14] Video content is also encrypted with published cryptographic ciphers (DES, 3DES or AES), but the certificates and key management technology are held secret, except in the limited case of CableCARDs.

of the *status quo* and an element of proprietary control. No HDMI interface will be found on any Internet modem or router. Where the subject is the implementation of Section 629 and reform of the Commission's regulations, HDMI is part of the problem – not a solution.

HDMI, while a secure interface, has no inherent security advantage. Ethernet output is transmitted every second of the day at comparable or higher levels of security. Billions of dollars in banking and e-commerce transactions are transmitted over Ethernet IP networks every day using standard cryptographic protocols. Cable networks themselves are almost entirely Ethernet-based, except for the *last mile*, where the content is converted into RF-modulated signals. Cable operators are entitled to choose HDMI as a display output for their own set-top boxes, and are entitled to require that interfaces to and from other devices be secure. In any reform of Commission regulations, MVPDs should not be entitled to require that any manufacturer rely on HDMI for any purpose.

In summary, there are no technical obstacles to prevent either MVPDs or competitive manufacturers from providing audiovisual products that are just as accessible and flexible as cable and DSL modems. The only limitations are those imposed by MVPDs as matters of business consideration.

B. Would a retail market for network agnostic video devices spur broadband use and adoption and achieve Section 629's goal of a competitive navigation device market for all MVPDs?

Retail devices already are able to access Internet-based video sources such as Netflix, Amazon.com, Blockbuster, Vudu, and others. Today these sources require separate retail devices (with separate remote controls, additional inputs on the television, separate power plugs, etc.) or specially designed televisions in order to access the

consumer's television screen.[15] Being unable to integrate these services with MVPD services is an inconvenience to consumers and a barrier to competitive business models. A solution is needed to enable retail devices to integrate these Internet-based video sources with programming available through MVPD networks.

1. How could the Commission develop a standard that would achieve a retail market for devices that can attach to all MVPD networks and access Internet-based video sources?

The Commission could, and should, develop a solution based on standard Internet communication protocols, by requiring each MVPD to provide to any consumer a "gateway" device with the sole function of providing a secure, standardized, open, IP-based interface for consumer audiovisual devices.[16] By providing such audiovisual gateway servers, MVPDs would support a retail market for devices to navigate among video sources, much as there is a retail market for PCs, printers, cameras, and other consumer products that connect to broadband networks through Internet home servers. The key is to ensure that the gateway is a simple, inexpensive device that is not encumbered with proprietary features, functions, and software that would turn it into a

[15] *See* http://www.netflix.com/NetflixReadyDevices?lnkce=nrd-otab; http://www.amazon.com/gp/video/ontv/ontv/; http://www.blockbuster.com/download/waystowatch/tv; http://www.vudu.com/.

[16] The Commission staff has proposed just such a solution in its December 16 Open Meeting presentation. "OPTIONS FOR A NATIONAL BROADBAND PLAN: Task Force Provides Framework for Final Phase in Development of Plan," Press Release, http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-295256A1.pdf, at 2, Dec. 16, 2009 (proposing "[r]equiring video services providers to supply a small, low-cost, network-interface device whose only function is to bridge proprietary network elements with retail navigation devices.") ("December 16 Press Release"). Public interest groups are also calling for such a solution. *See Implementation of Section 304 of the Telecommunications Act of 1996, International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act, A National Broadband Plan for our Future, Development of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act,* CS Docket No. 97-80; GN Docket No. 09-47, GN Docket No. 09-51, GN Docket No. 09-137, Petition for Rulemaking of Public Knowledge, et al. 30-37 ("Public Interest Petition"). TiVo endorses this solution.

gatekeeper rather than a gateway. For illustrative purposes, a diagram comparing an open gateway to a tru2way set-top box is attached as **Exhibit 1**.

The gateway would serve as a clear demarcation point between the technology-specific, proprietary MVPD network technology interface on one side and a home network based on ubiquitous and open Internet standards on the other. Differences in physical network technology, conditional access vendors, billing systems, and network protocols among the different MVPDs would be converted into a common interface at the gateway. This format is identical to the one by which MVPDs provide broadband services: Telco, cable and wireless providers use vastly different technologies on the external network, but use a common output interface (Ethernet) for home modems and servers.

This type of open gateway solution allows MVPDs to preserve the particular technology investments they have made in their distribution networks, while providing a common interconnection scheme for consumer devices relying on robust retail availability. It allows MVPDs to innovate and differentiate based on their network technology – for example, a telephone company upgrading from copper to fiber – without requiring the consumer to change anything within her home network.

The gateway provides a physical access point for services. As the Commission staff has suggested in its December 16 Open Meeting presentation and Public Knowledge has proposed, the gateway should be a small unit that interfaces with the proprietary MVPD network on one side, and provides a standard packet network interface on the home network side for interconnection to consumer devices.[17] MVPDs should be required to provide, at a minimum, a single choice of gateway device supporting a

[17] *See* December 16 Press Release at 2, Public Interest Petition at 30-37.

standard 100 Mbit/s Ethernet port. The MVPD might make available other gateways with other interfaces, such as WiFi or MoCA. Alternatively, the consumer would be free to use readily available home networking products, such as a wireless router, to connect the gateway with purchased devices.[18]

The gateway and consumer devices would use standard Internet protocols for basic communications, all built on top of TCP/IP and HTTP. Consumer devices such as PCs, game players, TiVo DVRs and mobile phones already support these protocols. Increasingly, consumers will expect all of their devices to support standard Internet protocols.

Consumer devices would be able to detect gateways automatically on the home network and automatically discover what services are available. Consumer devices on the network would be provided with access to all MVPD programming services without requiring those devices to run the operator's user interface. This would allow the integration of MVPD content with non-MVPD content in a single unified interface, providing consumers a choice of content and content sources.

If any encryption technology is used for content on the home network, the process for getting access to the keys/certificates for decryption should be independent of the MVPD or its industry consortium.

2. What are the pros and cons of each of these types of solutions, and which one would do the most to promote broadband adoption and utilization? Would any inhibit broadband adoption and utilization?

[18] TiVo believes that there is no reason why, in due course, new "set-top boxes" leased and licensed by MVPDs should not *also* be required to rely on the home gateway device. In addition to the assurance of common reliance, such a requirement would also allow consumers to choose to locate their leased devices someplace other than on the "set-top." TiVo urges the Commission to consider such a prospective requirement in its next request for public comment, which TiVo urges should be a Notice of Proposed Rulemaking.

The cable industry obviously knows that, when faced with the choice of buying or leasing a set-top box that performs exactly the same functions, in the same way, with the same user interface, consumers will opt to lease set-top boxes.[19] Consumers will buy only a set-top box that gives the consumer a real alternative in design and features. To provide this, competitive devices must have secure access to all of the MVPD's content plus additional sources, all presented with a competitive user interface. An apt analogy is Apple Mac computers and Windows PCs. Consumers pay a hefty premium for Apple products that access the same Internet and websites as PCs, principally because Apple products have a different graphical user interface and other design attributes that many consumers prefer.

A gateway device of the kind described above would do the most to promote broadband adoption and use because it would not only give consumers the *ability* to access broadband content on their televisions and other home devices besides PCs, but would also *encourage* them to make fuller use of broadband services and content outside of the traditional web browser and e-mail paradigms. Moreover, the competition that would be unleashed by enabling manufacturers to make truly competitive and innovative navigation devices would lower costs to consumers.[20] For example, TiVo today is offering its HD DVR to MSOs at a substantially lower cost than DVRs sold to smaller operators by the incumbent providers.[21]

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[19] Letter to Carlos Kirjner, Senior Advisor to the Chairman on Broadband and William Lake, Chief, Media Bureau from Kyle McSlarrow, President and CEO, National Cable & Telecommunications Association (Dec. 4, 2009).

[20] *See Implementation of Section 304 of the Telecommunications Act of 1996*, Report & Order, 13 FCC Rcd. 14775, 14785, ¶11 (1998) ("As a result of *Carterfone* . . . the choice of features and functions incorporated into a telephone has increased substantially, while the cost of equipment has decreased.").

[21] Todd Spangler, *Provider Aims To Launch HD DVRs By Start of 2010*, Multichannel News, http://www.multichannel.com/article/326959-RCN_Will_Follow_TiVo_s_Path.php (Aug. 10, 2009) ("'It's a pretty substantial savings as it relates to the upfront box' compared with the Motorola DVRs.").

C. Can the home broadband service model be adapted to allow video networks to connect and interact with home video network devices such as televisions, DVRs, and Home Theater PCs via a multimedia home networking standard?

The Commission need only specify the basic requirements for gateways to provide services to consumer devices on the home network. More sophisticated services may be provided by these gateways if desirable, so long as they are included within the sole gateway function, and the more sophisticated services are not made mandatory on downstream devices. For example, an MVPD may include support for DLNA compliance as a differentiator for their gateway. Limiting requirements to the minimum provides more freedom to consumers, service providers, and consumer electronics manufacturers to pick the features they want.

1. Are DLNA and HANA the only home networking standards that the Commission should consider in reviewing this model? If not, which other standards should the Commission consider?

The Commission should consider gateway and consumer devices using standard Internet protocols for basic communications, all built on top of TCP/IP and HTTP. A gateway provides a set of services to consumer devices on the network. The consumer devices thus need to be able to automatically detect gateways on the home network, as well as automatically discover what services are available.

An obvious technology choice for service discovery would be the Universal Plug and Play ("UPnP") family of protocols.[22] The UPnP standard, however, includes a number of required protocols and facilities that are unnecessary in the simplest gateway implementations, and add significantly to the software implementation effort. These should be strictly optional in the context of an MVPD gateway device.

[22] UPnP Forum, http://www.upnp.org.

The two required protocols in the basic gateway implementation are *gateway advertisement*, which allows a gateway to announce its presence to consumer devices on the home network, and *service browsing*, in which a consumer device can browse and access the available services on the gateway. Therefore, we suggest that the Commission consider requiring that the basic gateway only support specific protocols for these two purposes.

Gateway advertisement uses mDNS (Multicast DNS) from the Zero Configuration Networking project.[23] Apple provides a high quality open-source implementation of mDNS called Bonjour.[24] The mDNS protocol has been implemented in a large number of simple devices, from network cameras to mobile phones, and should be easy to implement in a basic gateway.

Because of the nature of mDNS, the consumer need not be concerned with host names, and multiple gateways on a home network are handled automatically. Each gateway will advertise its supported services. We suggest that two services can be advertised: one is "**<*gateway name*>._linear._tcp._local"** for regular linear television channels, and the second is "**<*gateway name*>._vod._tcp._local"** for video-on-demand service. The *gateway name* could be a short MVPD identifier (e.g., "Comcast Service Gateway"). Included in the advertisement would be a "friendly name" for the service, for instance "Comcast Digital Television," and a URL indicating where the third-party device can acquire a list of the available content from that service, said URL typically pointing at the local gateway (although this is not required). This form of simple naming

[23] *See* "Wikipedia: Zero Configuration Networking," http://en.wikipedia.org/wiki/Zero_configuration_networking.
[24] "Developer Connection: Bonjour," http://developer.apple.com/networking/bonjour/.

scheme would also make it easy to use existing tools to manually browse and display the services available on the network during setup and troubleshooting.

Service browsing is performed using an HTTP GET on the given URL, which returns an XML (eXtensible Markup Language),[25] document formatted according to the conventions of RSS 2.0 (Really Simple Syndication). Each content item is described using the format defined for the RSS 2.0 Media Module.[26] This allows ordinary web browsers to fetch the list, and aids in debugging and identifying problems. The basic gateway has no need to parse XML documents (as it would in a full UPnP network). It simply needs to supply the list of available services in XML format, which can be done programmatically without a parser implementation.

In addition to the standard available stream information, the RSS response may also include diagnostic information, such as the currently tuned frequencies of the gateway broadcast tuners, the signal strength and BER (bit error rate) on each. An installer or consumer could then verify service connectivity using any device supporting a standard web browser.

2. What are the strengths and weaknesses of each home networking standard?

HANA has dissolved as of September 2009.[27] Moreover, HANA was limited to a single physical connector technology that (1) has not seen widespread adoption and (2) is relatively expensive compared to other network interfaces. HANA also required retail devices to display the user interface of the MVPD's gateway device, limiting user

[25] "Wikipedia: XML," http://en.wikipedia.org/wiki/XML.
[26] "Media RSS Module," http://video.search.yahoo.com/mrss.
[27] *See* "Dissolution of HANA and the Transfer of Assets to the 1394 Trade Association," Oct. 1, 2009, http://www.hanaalliance.org/about/HANA/MemoFromThePresident.pdf

interface innovation on the retail consumer device. HANA is no longer a viable option for a standard home networking interface.

As described above, there is no reason for the Commission to dictate use of a particular home networking standard as long as the gateway device is required to allow the basic functionality of content discovery and service browsing.

3. Would any of these standards allow consumers to use existing technology? For example, many devices already in consumers' homes can accept firmware upgrades and are already DLNA or HANA certified. Could the Commission adopt a network interface standard that allows those devices to connect to an MVPD network?

There are few devices designed primarily for the display or recording of audiovisual content that either support DLNA today or could be remotely upgraded to support it. However there are many MVPD devices in homes today that could be remotely upgraded to support an IP-based home networking protocol for sharing content among retail consumer devices that also have an IP connection. This protocol does not have to be as large in scope as DLNA, however. By using a smaller set of protocols, more devices would be eligible for remote upgrade because some older devices may not have the ability to run the full DLNA software stack. Gateways (and home devices) could of course be DLNA compatible as a point of differentiation, but there is no reason to mandate this for all gateways.

D. What obstacles stand in the way of video convergence?

Most fundamentally, except for the limited access provided by the CableCARD, which is available only for cable systems, there is no way for a consumer device to provide essential navigation functions. Generally, content is available to competitive devices only via one digital output, HDMI, which does not provide a way for consumer

devices to choose or record content – just to display whatever is delivered by a set-top box.

1. Given the flood of video content that is now available from a multitude of sources, what obstacles stand in the way of allowing consumers to navigate those sources? What can the Commission do to eliminate those obstacles?

Both in leased set-top boxes and in sole-purpose gateway devices as described above, the Commission should require that MVPDs provide a way for downstream devices to navigate and obtain content via an IP-based interface, either via Ethernet or a USB-to-Ethernet converter. This output must allow for navigation and reception of all audio and video services of the operator. If a consumer selects a switched or on-demand service, the MVPD's set-top or gateway will translate that request into whatever proprietary communication format the network uses.

In the broadband world, free and paid Internet content can be displayed and browsed in a single user interface. There is no technical reason or policy justification to prevent a consumer audiovisual device from doing this. Consumer navigation devices should be able to integrate free and paid MVPD offerings into an interface that also offers services and programming from other sources. Consumer devices that offer alternative sources on their main menu should not be prohibited from offering MVPD programming and services on the same menu. Translating requests from consumer devices over the IP interface into requests sent up the proprietary network will most likely require only a software upgrade. This would allow the MVPD to change any of the technology on their access network, without requiring each consumer device on the home network to change its protocols.

2. Is there a solution that would allow MVPDs to continue innovating without making navigation devices obsolete when MVPDs adopt incompatible delivery methods?

Yes, the open gateway approach discussed above would provide for a clear demarcation between the operator's access network technologies and the home network protocols. It will allow operators to innovate and differentiate their offerings without making consumer navigation devices obsolete. This is the broadband services model today, in which a consumer can switch from a DSL modem to a cable modem without changing any of the devices that use the home network. In the same way, an MVPD could innovate and migrate from linear to switched video services, from MPEG to IP encapsulation, or from wired to wireless delivery without disabling the consumer's navigation devices.

3. Would a network interface solution address the concerns raised regarding cost and complexity of device certification and approval? Why or why not?

Yes; today, a consumer can choose from thousands of different personal computers, run any of dozens of different web browser applications, connect to networks via several broadband service providers, and still be able to navigate to almost any website and securely access services including watching high-value video content and on-line banking. Economical, competitive, open and secure solutions exist today using IP protocols.

Concerns would be raised if MVPDs would continue to insist on using complex certification processes; require the use, in inappropriate or unnecessary circumstances, of feature-heavy software such as occurs in full tru2way implementations; or add such complexity to their protocols that a large amount of interoperability testing would be required. Existing Internet services provide beneficial examples of ecommerce and video

programming over broadband *without* complex, expensive, time-consuming, and potentially arbitrary certification. Thousands of devices can navigate millions of web services without any complex software requirements on the user end. And millions of consumer devices attach to and interoperate with the Web over Ethernet without several years of interoperability testing and delays in network support – as has been experienced to date with tru2way.

Conclusion

TiVo applauds the Commission's effort to gain a full picture of the state of video device competition and potential solutions to the current anti-competitive environment. As suggested in Public Notice # 27, requiring MVPDs to provide a gateway device that does nothing more than provide an interface between MVPDs' proprietary networks and home networks, employing standard, open protocols, would promote competition in video devices, lower costs to consumers, and encourage broadband use.

Respectfully submitted,

TIVO INC.

Matthew Zinn

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Matthew Zinn
Senior Vice President, General Counsel,
Secretary & Chief Privacy Officer
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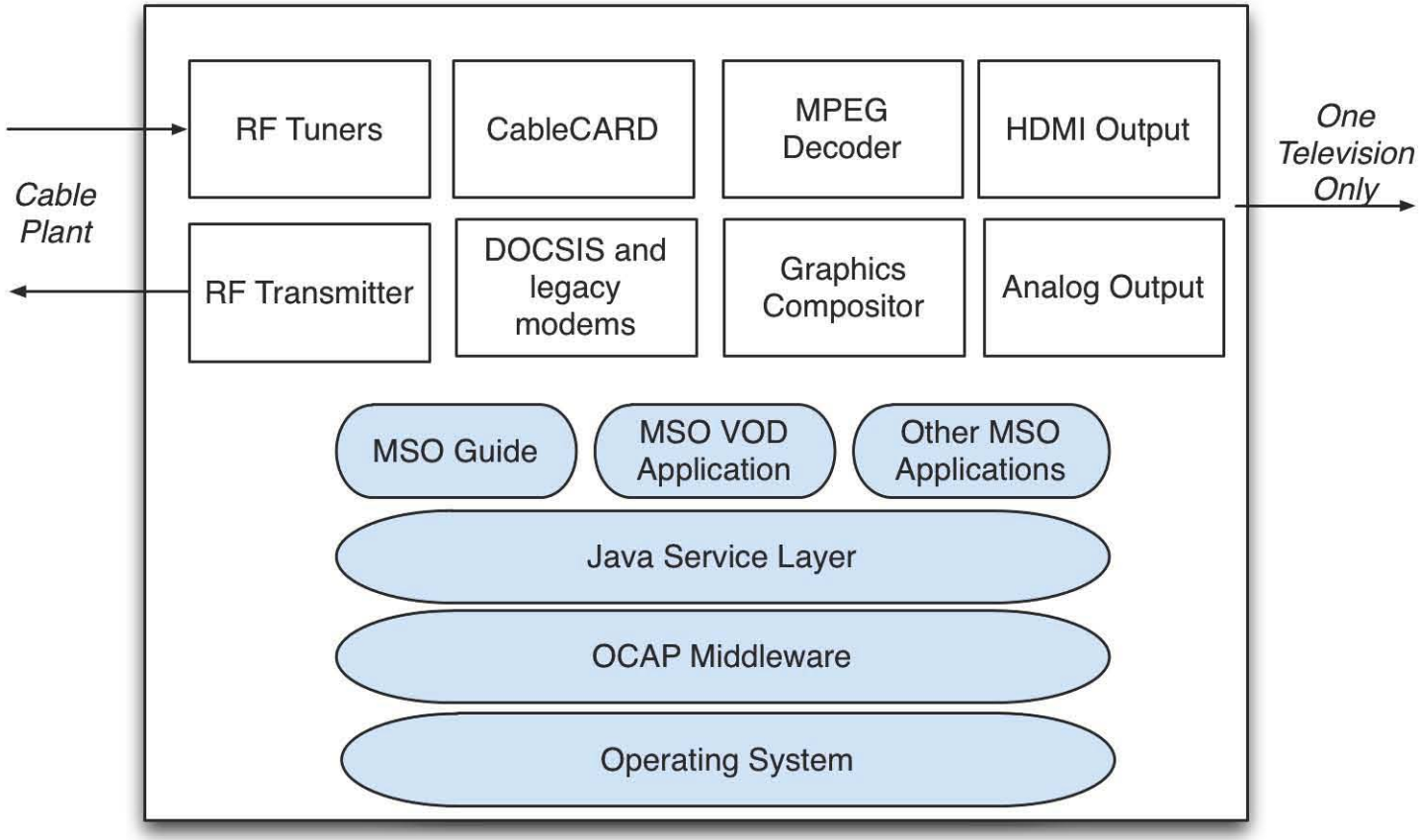
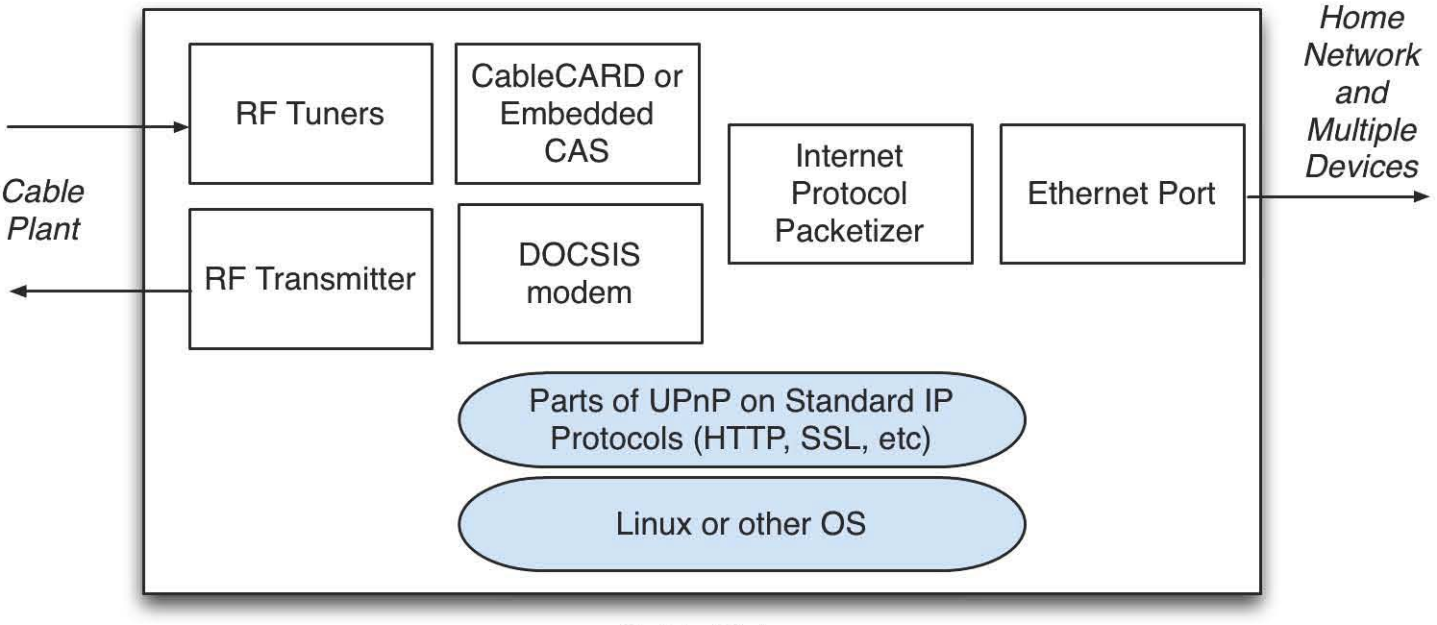
Dated: December 22, 2009

Exhibit 1



tru2way Cable Set-top



Cable Gateway